

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

REMARKS

Claims 1-103 were pending in the present application. Claims 1, 3-12, 36-41, and 43-45 have been amended, and claims 2, and 46-103 were canceled. Claims 13-35, and 42 are withdrawn. As a result of this amendment, claims 1, 3-12, 36-41, and 43-45 are pending. Reexamination and reconsideration are requested in light of the accompanying amendments and remarks.

Claims 46-103 have been canceled without prejudice pending their resubmission in a timely filed divisional application.

Applicants have updated the cross-reference information by amending the paragraph beginning on page 1, line 4.

The rejection of claim 44 under 35 U.S.C. § 112, first paragraph has been overcome. The specification has been amended to recite that the pigment exhibits a color change between oxidation states, for example, between the trivalent and divalent cobalt oxidation states. Support for this amendment can be found in claim 44 as filed.

The rejection of claims 1, 2, 6-8, 36-39, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by applicants' admissions on pages 4 and 17 has been overcome. As discussed on p. 17, Co_2O_3 and Co_2O_4 , which have a solubility in water of about 1×10^{-5} moles per liter of trivalent cobalt, would not serve as effective corrosion inhibiting pigments because they are too insoluble. Claim 1 has been amended to recite that "the cobalt/valence stabilizer complex has a solubility in water of between about 1×10^{-1} and about 5×10^{-5} moles per liter of cobalt at about 25°C and about 760 Torr."

Therefore, applicants' admissions do not anticipate claims 1, 2, 6-8, 36-39, and 43-45.

The rejection of claims 1-10, 36-39, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by Desmond (U.S. Patent No. 4,564,511) has been overcome. Desmond teaches a method for preparing a molecular sieving metallosilicate. The process utilizes heteropolymetallates which are reacted with other components to form the metallosilicate.

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

Desmond does not teach or suggest a corrosion-resistant pigment composition as now claimed. Desmond does not teach or suggest a corrosion-inhibiting pigment and a coating system, as claimed.

Therefore, Desmond does not anticipate claims 1, 2, 6-8, 36-39, and 43-45.

The rejection of claims 1-10, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by Chemical Abstracts Registry 100687-47-6 or 246459-53-7 has been overcome. The Chemical Abstracts citations teach cobalt (III) periodate and iodate.

The Chemical Abstracts citations do not teach or suggest a corrosion-resistant pigment composition as now claimed. The Chemical Abstracts citations do not teach or suggest a corrosion-inhibiting pigment and a coating system, as claimed.

Therefore, the Chemical Abstracts citations do not anticipate claims 1-10, and 43-45.

The rejection of claims 1-9, 36-39, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by Takahashi (U.S. Patent No. 5,188,993) has been overcome. Takahashi teaches a microwave dielectric ceramic composition.

Takahashi does not teach or suggest a corrosion-resistant pigment composition as now claimed. Takahashi does not teach or suggest a corrosion-inhibiting pigment and a coating system, as claimed.

Therefore, Takahashi does not anticipate claims 1-9, 36-39, and 43-45.

The rejection of claims 1-8, 36-39, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by Swiler (U.S. Patent No. 6,582,814) has been overcome. Swiler teaches rare earth-transition metal oxides used as pigments.

Swiler does not teach or suggest a corrosion-resistant pigment composition as now claimed. LaCoO₃ would likely have a low solubility in water, comparable to or less than Co₂O₃ and Co₃O₄, which are below the claimed limits. The reasons for this are the following: 1) the compounds would need to be formed by firing together the rare earth and cobalt compounds in a furnace; 2) the cobalt oxides discussed above are usually formed in the same way; 3) rare earth metals exhibit significantly higher atomic weights than cobalt, so the resultant formula weights

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

are heavier than cobalt alone; and 4) solubility is generally inversely proportional to formula or atomic weight.

Therefore, Swiler does not anticipate claims 1-8, 36-39, and 43-45.

The rejection of claims 1-8, 36-41, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by Schapira (U.S. Patent No. 6,068,709) has been overcome. Schapira teaches a process for the phosphatization of metallic substrates comprising the use of a phosphatization bath having a pH from about 1 to 5.5 and which comprises from about 0.3 to about 25 g/l of zinc ion, from about 5 to about 50 g/l phosphate ion, and from about 0.01 to about 10 g/l of a trivalent cobalt complex represented by 1 of 2 formulas. Col. 2, lines 28-62.

In Schapira, the trivalent cobalt complex in aqueous solution is an accelerator for the phosphating process. As discussed in "Phosphate Coatings," ASM Handbook, Vol. 5, p. 379, 1994, and "Chemical Conversion and Anodized Coatings," R. Burns et al., Protective Coatings for Metals, p. 547, 1955 (copies attached), accelerators for phosphating solutions are oxidizers, typically nitrates, nitrites, chlorates, nitroguanidine, hydrogen peroxide, etc., dissolved in the phosphating bath that increase the reaction rate with the metal substrate by eliminating hydrogen formation. Schapira does not teach or suggest the use of trivalent or tetravalent cobalt in a pigment or pigment composition.

Claim 1 recites that the trivalent or tetravalent cobalt/valence stabilizer complex is present in the pigment itself in order to provide adequate corrosion protection. Claim 1 also recites the solubility of the cobalt/valence stabilizer complex. The dependent claims further describe the physicochemical characteristics that the oxidized trivalent or tetravalent cobalt exhibits in the coating in order to provide adequate corrosion protection.

The general concept of valence stabilization of cobalt in solution was known. However, a trivalent or tetravalent cobalt/ valence stabilizer complex incorporated in a pigment or pigment composition for corrosion inhibition is novel.

The ability to stabilize trivalent cobalt in solution as described in Schapira does not guarantee an effective pigment or pigment composition. In the majority of cases, adding

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

stabilizers to the bath is detrimental to the coating formed because of solubility differences. The cobalt complexes described in Schapira have high aqueous solubilities. For example, Merck Index, 13 Ed. P. 8683 describes $[\text{Co}(\text{NO}_2)_6]\text{Na}_3$ as “very soluble in water.” Although a compound that is “very soluble in water” may be an excellent choice as an accelerator for phosphating solutions, it would be a poor choice for a constituent compound in a pigment because it would be washed away quickly by corrosive media.

The high aqueous solubility of the compounds in Schapira is evidenced in the steps required to form the compounds and separate them from solution. For example, processes involving $[\text{Co}(\text{NO}_2)_6]\text{Na}_3$ are described in Chemical Abstracts Vol. 26, 3200, Chemical Abstracts 1628, and Chemical Abstracts Vol. 45, 4167 (copies of which are enclosed). $[\text{Co}(\text{NO}_2)_6]\text{Na}_3$ is used as a water-soluble precipitating agent for potassium. The sodium salt of $\text{Co}(\text{NO}_2)_6$ exhibits high water solubility. Schapira does not describe the use of the potassium salt because its low solubility would make it unavailable in solution as a phosphating accelerator. The formation of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ from aqueous solution requires “salting out” with the addition of 400 ml of concentrated HCl to 1500 ml water with 230 g of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ contained therein. Inorganic Syntheses, Vol. 2, pp. 217-218. Preparation of $[\text{Co}(\text{NO}_3)(\text{NH}_3)_5](\text{NO}_3)_2$ from the equally high solubility $[\text{Co}(\text{NH}_3)_5\text{CO}_3]\text{NO}_3$ and nitric acid is detailed in Inorganic Syntheses, Vol. 4, p. 174, 1953 (copy attached). 100 ml of methanol must be added to the 25 ml of water (a standard “salting-out” procedure), followed by heating for 18 hours at 100°C to drive water off in order to produce 10 g of the desired compound. Similarly, the synthesis of $[\text{Co}(\text{NH}_3)_5\text{CO}_3]\text{NO}_3$ requires extensive evaporation to begin to obtain the product (1.6 l to 500 ml), Inorganic Syntheses, Vol. 6, p. 173-174 (copy attached), demonstrating that even the use of carbonate as a trivalent cobalt valence stabilizer in solution does not ensure that a sparingly soluble trivalent cobalt compound will result. Synthesis of $[\text{Co}(\text{oxalate})\text{en}_2]\text{Cl}$, which is analogous to Schapira’s $[\text{Co}(\text{oxalate})\text{en}_2]\text{NO}_3$ also requires extensive evaporation to acquire a product. (Mori, et al. Bull. Chem. Soc. Japan 31:291-5, 1958; CA 52: 18060) (copy attached).

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

These examples show that there is a significant difference between stabilization in solution, where maximum solubility is desirable, and stabilization in a pigment and pigment composition, where sparingly soluble characteristics are desired. Schapira is concerned with the presence of trivalent cobalt as an accelerator for phosphating baths. Because of this requirement, high solubility in the water bath is necessary. If the solubility of a compound in water is too low, then the compound will be unavailable in the bath to act as an accelerator. Conversely, the present invention involves the presence of a sparingly soluble compound in the pigment. Nowhere in Schapira are the solubility requirements for the trivalent compounds discussed. Schapira's trivalent compounds are unusable as pigments in the present invention because of their high solubility, a necessary requirement to act as an accelerator for the phosphating bath.

According to the examiner, compounds taught by Schapira "meet the requirements of the claims and thus must have the properties of the claimed 2-7 and 43-45. However, as explained above, the presence of a stabilized cobalt compound in solution as in Schapira is not the same as a cobalt/valence stabilizer complex within the pigment. Moreover, Schapira's cobalt compounds do not have the claimed solubility, as discussed. The dependent claims further describe the physicochemical characteristics that the oxidized trivalent or tetravalent cobalt exhibits in the pigment composition in order to provide adequate corrosion protection, characteristics which are not inherent in Schapira's cobalt stabilized in solution.

With respect to claims 11-12, the cobalt compounds of Schapira do not inherently have a central cavity containing a cobalt ion and an additional ion. Nowhere in Schapira is there any type of cobalt compound which has a central cavity containing a cobalt ion and an additional ion. See p. 134, line 13 to p. 135, line 3. The examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. MPEP 2112. All organic compounds and simple inorganic compounds bond directly to the cobalt ion, whether in solution or in the coating. The valence stabilizers with a central cavity are the larger inorganic valence stabilizers that can polymerize, i.e., the heteropolymetallates, such as molybdate, tungstate,

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

vanadate, etc. See p. 26, line 2 to p. 27, line 18, and p. 134, line 13 to p. 135, line 3. None of Schapira's compounds have a central cavity having another metal ion in it. The central cavity only contains the trivalent cobalt ion.

Thus, claims 1-8, 36-41, and 43-45 are not anticipated by Schapira.

The rejection of claims 1-8, 36-39, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by EP 0 488 430 (Schriever 430) has been overcome. Schriever 430 teaches a cobalt conversion coating.

Schriever 430 does not teach or suggest a corrosion-resistant pigment composition as now claimed. Schriever 430 does not teach or suggest a corrosion-inhibiting pigment and a coating system, as claimed.

Conversion coatings are formed during the intentional exposure of metal to a chemically reactive solution. The metal is exposed to a compound that chemically alters the surface and forms a coating that provides a high degree of corrosion protection. The protective film is produced by a chemical redox reaction between the metal surface and the conversions coating solution.

In contrast, the claimed invention is a pigment composition containing a pigment and a coating system.

In addition, sodium and lithium cobaltinitrite have a higher solubility than claimed, and Co_2O_3 and Co_3O_4 , have a lower solubility.

Therefore, Schriever 430 does not anticipate claims 1-8, 36-39, and 43-45.

The rejection of claims 1-11, 36, 37, 40, 41, and 43-45 under 35 U.S.C. § 102(b) as being anticipated by EP 0 488 430 [sic - EP 0 523 288 (Schriever 288)] has been overcome. Schriever 288 teaches a cobalt conversion coating.

Schriever 288 teaches a conversion coating, which is described above. Schriever 288 does not teach or suggest a corrosion-resistant pigment composition as now claimed. Schriever 288 does not teach or suggest a corrosion-inhibiting pigment and a coating system, as claimed.

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

In addition, some of the compounds cited by the examiner have solubilities higher than claimed, as discussed above. The formation of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ from aqueous solution requires "salting out" with the addition of 400 ml of concentrated HCl to 1500 ml water with 230 g of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ contained therein. Inorganic Syntheses, Vol. 2, pp. 217-218. Preparation of $[\text{Co}(\text{NO}_3)_5(\text{NH}_3)_5](\text{NO}_3)_2$ from the equally high solubility $[\text{Co}(\text{NH}_3)_5\text{CO}_3]\text{NO}_3$ and nitric acid is detailed in Inorganic Syntheses, Vol. 4, p. 174, 1953. 100 ml of methanol must be added to the 25 ml of water (a standard "salting-out" procedure), followed by heating for 18 hours at 100°C to drive water off in order to produce 10 g of the desired compound. Similarly, the synthesis of $[\text{Co}(\text{NH}_3)_5\text{CO}_3]\text{NO}_3$ requires extensive evaporation to begin to obtain the product (1.6 l to 500 ml), Inorganic Syntheses, Vol. 6, p. 173-174, demonstrating that even the use of carbonate as a trivalent cobalt valence stabilizer in solution does not ensure that a sparingly soluble trivalent cobalt compound will result. Co_2O_3 and Co_3O_4 , have a lower solubility.

Therefore, Schriever 288 does not anticipate claims 1-11, 36, 37, 40, 41, and 43-45.

The rejection of claims 1-12, 36-39, and 43-45 under 35 U.S.C. § 103(a) as being unpatentable over Desmond has been overcome. Desmond teaches a method for preparing a molecular sieving metallosilicate. The process utilizes heteropolymetallates which are reacted with other components to form the metallosilicate.

Desmond does not teach or suggest a corrosion-resistant pigment composition as now claimed. Desmond does not teach or suggest a corrosion-inhibiting pigment and a coating system, as claimed.

Therefore, claims 1-12, 36-39, and 43-45 would not have been obvious to one having ordinary skill in the art at the time the invention was made over Desmond.

Claims 1-12, 36-41, and 43-45 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3-5, 7-11, 35-40, and 124 of co-pending Application No. 10/038,150. A terminal disclaimer has been filed accompanying this paper to overcome this rejection.

Official Amendment

Serial No. – 10/037,576

Docket No. – UVD 0279 PA / 40815.320

Claims 1-12, 36-41, and 43-45 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3-5, 10-13, 37-42, 123, 135-139, 148, 151, and 152 of copending Application Serial No. 10/038,274. A terminal disclaimer has been filed accompanying this paper to overcome this rejection.

Claims 13-35 and 42 were withdrawn because there was no allowable generic claim. Claim 1 as amended is an allowable generic claim. Applicants respectfully request that claims 13-35 and 42 be rejoined and allowed.

CONCLUSION

Applicants respectfully submit that, in view of the above amendment and remarks, the application is now in condition for allowance. Applicants respectfully request that claims 1, and 3-45 be passed to allowance.

If the Examiner has any questions or comments regarding the present application, he is invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,
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